

Steel Design - LRFD

AISC Steel Manual 13th edition

Column Design Tutorial

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1 Introduction

According to the LRFD methodology columns must be selected such that the following basic equation is satisfied:

$$\phi P_n \geq P_u$$

Therefore, column design requires the determination of ϕP_n . To do this, for a particular column, the slenderness, KL/r , of the column must be determined. This tutorial outlines the relevant information needed to obtain the column's governing slenderness and then subsequently determine ϕP_n .

2 Slenderness Ratio

Every column has a slenderness ratio calculated as KL/r where K is the effective length factor, L is the column length and r is the radius of gyration for the column cross-section about the axis that governs buckling. The slenderness ratio for compression members preferably should not exceed 200. The slenderness may need to be calculated for buckling about each axis of the column cross-section. The largest of the following values, $K_x L_x / r_x$, $K_y L_y / r_y$ or possibly $K_z L_z / r_z$, must be used.

2.1 Effective Length Factor

Depending on the type of building and column end conditions, the effective length factor, K , may be determined as follows:

(a.) Braced frames(Non-sway Frames)

i. Non-moment connections at the column joints.

$$K = 1.0$$

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Handbook of Civil Engineering Calculations, Second Edition Tyler G. Hicks, S. David Hicks, 2007-05-23 Table of Contents Preface How to Use This Handbook Sect 1 Structural Steel Engineering and Design Sect 2 Reinforced and Prestressed Concrete Engineering and Design Sect 3 Timber Engineering Sect 4 Soil Mechanics Sect 5 Surveying Route Design and Highway Bridges Sect 6 Fluid Mechanics Pumps Piping and Hydro Power Sect 7 Water Supply and Stormwater System Design Sect 8 Sanitary Wastewater Treatment and Control Sect 9 Engineering Economics Index I **Structural Design Guide** Edward S. Hoffman, 1996-08-31 This essential guide clearly explains the American Institute for Steel Construction AISC Load and Resistance Factor Design LRFD Specifications and Commentary enabling readers to conform with and profit from the design aids and tables in the AISC Manuals of Steel Construction Volumes I and II It provides readers with valuable specification interpretations analysis and design examples and graphs providing ready made solutions to complex code formulas Special features of this practical volume include quick and economical beam selection tables detailed truss design examples and coefficients for shears moments and points of inflection It contains a variety of numerical examples along with discussions of material specifications The design requirements included in the LRFD specifications are arranged in an accessible manner making it easy to pinpoint the design of specific elements This single volume resource offers structural engineers essential material necessary for designing efficient structural steel buildings Engineering students in related courses will find this book invaluable for understanding and becoming acclimated with the AISC and LRFD standard design practices [Guide to Application of the 1991 NEHRP Recommended Provisions in Earthquake-Resistant Building Design](#) James R. Harris, 1996-07 Provides architects designing buildings in seismic risk areas with the information needed to effectively utilize the National earthquake Hazards Reduction program NEHRP Recommended Provisions Rigorously updated this manual includes the best most current technological information for reducing safety hazards Chapter topics include fundamentals structural analysis structural steel reinforced concrete timber masonry nonstructural elements List of symbols Metric unit conversion tables Graphs charts **The Civil Engineering Handbook** W.F. Chen, J.Y. Richard Liew, 2002-08-29 Providing extensive coverage of all major areas of civil engineering the second edition of this award winning handbook features contributions from leading professionals and academicians and is packed with formulae data tables and definitions vignettes on topics of recent interest and additional sources of information It includes a wealth of material in areas such as coastal engineering polymeric materials computer methods shear stresses in beams and pavement performance evaluation Its wide range of information makes it an essential resource for anyone working in civil structural or environmental engineering **Handbook of Structural Engineering** W.F. Chen, E.M. Lui, 2005-02-28 Continuing the best selling tradition of the Handbook of Structural Engineering this second edition is a comprehensive reference to the broad spectrum of structural engineering encapsulating the theoretical practical and

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